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FOR: ILLUMINATION KNOB AND METHOD OF MANUFACTURING
KNOB

VERIFICATION OF A TRANSLATION

Assistant Commissioner for Patents

Washington, D.C. 20231

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I, the below named translator, hereby declare that:

1. My name and post office address are as stated below.
2. That I am knowledgeable in the English language and in the language of JP2002-329431, and I believe the attached English translation to be a true and complete translation of JP2002-329431.
3. The document for which the attached English translation is being submitted is a patent application on an invention entitled ILLUMINATION KNOB AND METHOD OF MANUFACTURING KNOB.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: February 3, 2005

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[NAME OF ARTICLE] Drawing 1

[NAME OF ARTICLE] Abstract 1

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[Name of the Document] Specification

[Title of the Invention] ILLUMINATION KNOB AND METHOD OF
MANUFACTURING THE SAME

[Claims]

[Claim 1] An illumination knob comprising:

a knob section having an opening at its upper surface;

a holder provided under a lower surface of the knob section; and

a light-transmittable light guide unit accommodated and latched in
the holder,

wherein an elastic pawl, which protrudes downward and contacts an
outer surface of the light guide unit at its inner surface, is provided at the
lower surface of the knob section,

wherein a holding section, which contacts an outer surface of the
elastic pawl, is provided at the holder,

wherein one of the elastic pawl and the holding section has a
protrusion, and an other of the elastic pawl and the holding section has a
recess and latched to the protrusion.

[Claim 2] The illumination knob of claim 1,

wherein an extending section which protrudes downward and
outward from the elastic pawl under the lower surface of the knob section is
provided, and an inner surface of the extending section contacts an outer
surface of the holding section of the holder.

[Claim 3] A method of manufacturing the illumination knob of claim
1 comprising:

combining the holder with the lower surface of the knob section;

inserting the light guide unit into the holder;

sandwiching the elastic pawl between the outer surface of the light guide unit and the inner surface of a holding section.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

The present invention relates to an illumination knob used at a controlling panel of a vehicle or the like and to a method of manufacturing the knob.

[0002]

[Background Art]

Recently, as vehicles and various electronic apparatuses have been more functional and diversified, a switch provided on a control panel of each of them often has an illumination knob. For confirming and recognizing the position of the switch even in a dark, the illumination knob is illuminated by a luminous source provided in the control panel.

[0003]

A conventional illumination knob will be described with reference to Fig. 4 through Fig. 5B.

[0004]

Fig. 4 is a sectional view of the conventional illumination knob. Reference numeral 1 denotes a knob section made of insulating resin having opening 1A at its upper surface. A pair of elastic pawls 1C, which protrudes downward and has recesses 1B on its inner surface, is formed at a lower surface of knob section 1.

[0005]

Reference numeral 2 denotes a holder made of insulating resin having a substantially cylindrical shape. Holder 2 has a pair of protrusions 2A formed on its outer surface, and the recesses 2A are latched on recesses 1B. Thus, holder 2 is attached at a lower section of knob section 1.

[0006]

Reference numeral 3 denotes a light-transmittable light guide unit. Display section 3A of an upper end of light guide unit 3 is inserted into opening 1A of knob section 1. Light guide unit 3 has a pair of protrusions 3B provided at a lower end of unit 3, and the protrusions 3B are latched in holes 2B of a lower end of holder 2. Therefore, light guide unit 3 is accommodated and fixed in holder 2, thus providing the illumination knob.

[0007]

As shown in an exploded sectional view of Fig. 5(a), light guide unit 3 is inserted into holder 2 from underneath of holder 2. Then protrusions 3B at the lower end of light guide unit 3 are latched in holes 2B, thus combining holder 2 with light guide unit 3.

[0008]

Next, as shown in Fig. 5(b), this is inserted into knob section 1 at an outer surface of holder 2 from underneath section 1, and elastic pawls 1C elastically deforms in right and left directions. Then, recesses 1B are latched on protrusions 2A by elastic restoring force of elastic pawls 1C, thus combining holder 2 with the lower section of knob section 1 to provide the illumination knob.

[0009]

This illumination knob is mounted at the switch provided on the control panel. When the luminous element, such as a light bulb or a light emitting diode, in the control panel emits light, the light is transmitted through light guide unit 3 and illuminates display section 3A inserted into opening 1A. This structure allows the position of knob section 1 to be confirmed and recognized even in a dark.

[0010]

For example, patent document 1 is known as prior art information of the present invention.

[0011]

[Patent Document 1]

Japanese Patent Laid-Open Publication 8-207622.

[0012]

[Problems to be Solved by the Invention]

In the conventional illumination knob, knob section 1 holds holder 2 and light guide unit 3 with elastic pawls 1C. When display section 3A of an upper surface of knob section 1 is pressed by strong force, the force is transmitted from light guide unit 3 to holder 2. The force may make elastic pawls 1C open in right and left directions, thus unlatching protrusions 2A from recesses 1B. As a result, holder 2 and light guide unit 3 may be fallen from knob section 1.

[0013]

To prevent the falling, it is necessary to applying adhesive to recesses 1B and protrusions 2A or welding elastic pawls 1C of knob section 1 to holder 2. These operations make the illumination knob need a long time to

manufacture and be expensive.

[0014]

The present invention is directed to solve the problems pointed out above, and therefore, it is an object of the invention to provide an inexpensive and easy-assembling illumination knob which secures holding of components and a manufacturing method using the same.

[0015]

[Means to Solve the Problems]

To solve the problems discussed above, the present invention includes the following elements.

[0016]

According to the present invention of claim 1, an elastic pawl, which protrudes downward and contacts an outer surface of a light guide unit at its inner surface, is provided at a lower surface of a knob section. A holding section, which contacts an outer surface of the elastic pawl, is provided at the holder. One of the elastic pawl and the holding section has a protrusion, and the other of the elastic pawl and the holding section has a recess and latched to the protrusion. Thus, an illumination knob is constructed. An inner surface and an outer surface of the elastic pawl are sandwiched between an outer surface of the light guide unit and the holding section. Therefore, even when a display section of an upper surface of the knob section is pressed by strong force, the elastic pawl is not opened. The illumination knob can secure holding of components, and adhesion or welding is not necessary, so that an inexpensive and easy-assembling illumination knob can be obtained.

[0017]

According to the present invention of claim 2, an extending section which protrudes downward and outward from an elastic pawl under a lower surface of a knob section is provided, and an inner surface of the extending section contacts an outer surface of a holding section of a holder. The extending section prevents the holding section of the holder from deforming, thus holding the constituent components more securely.

[0018]

The present invention of claim 3 is a manufacturing method of the illumination knob. In the invention of claim 1, the light guide unit is inserted into the holder after the holder is combined with the lower surface of the knob section, and then the elastic pawl is sandwiched between the outer surface of the light guide unit and the inner surface of a holding section. An illumination knob which secures holding of components and is assembled easy can be realized.

[0019]

[Description of the Preferred Embodiments]

Exemplary embodiments of the present invention are demonstrated hereinafter with reference to Figs. 1-3.

[0020]

(Embodiments)

Fig. 1 is a sectional view of an illumination knob in accordance with an exemplary embodiment of the present invention. In Fig. 1, reference numeral 11 denotes a dark-colored knob section made of insulating resin, such as ABS or polycarbonate. Opening 11A shaped in a mark, character

or letter is formed in an upper surface of knob section 11. A pair of elastic pawls 11C protruding downward are formed at a lower surface of knob section 11, and have recesses 11B in their outer surface.

[0021]

Reference numeral 12 denotes a holder in a substantially cylindrical shape or a U-shape made of resin, such as polyacetal or poly butylene terephthalate. Holding section 12A provided at an upper end of holder 12 contacts an outer surface of elastic pawl 11C. A pair of protrusions 12B formed at inner surfaces of holding sections 12A are latched in recesses 11B at an outer surface of elastic pawls 11C, thus combining holder 12 with a lower section of knob section 11.

[0022]

Reference numeral 13 denotes a light-transmittable light guide unit made of insulating resin, such as acrylic or polycarbonate. Display section 13A of an upper end of light guide unit 13 is inserted into opening 11A of knob section 11. A pair of protrusions 13B of a lower end of light guide unit 13 are latched in hole 12C of a lower end of holder 12, thus accommodating and latching light guide unit 13 in holder 12.

[0023]

A surface of light guide unit 13 contacts inner surfaces of elastic pawls 11C protruding downward from a lower surface of knob section 11. Pawl 11C for holding holder 12 is sandwiched between the surface of light guide unit 13 and holding section 12A, thus providing the illumination knob.

[0024]

Next, a method of manufacturing the illumination knob will be described with reference to an exploded sectional view of Fig. 2.

[0025]

First, as shown in Fig. 2(a), holder 12 is inserted into knob section 11 from underneath the section 11 in a direction D while allowing elastic pawls 11C to elastically deform inside by holding sections 12A. Then, recesses 11B are latched on protrusions 12B by elastic restoring force of elastic pawls 11C, thus combining knob section 11 with holder 12.

[0026]

Then, as shown in Fig. 2B, light guide unit 13 is inserted into holder 12 from underneath the holder 12. An inner surface and an outer surface of elastic pawl 11C are sandwiched between an upper end of an outer surface of light guide unit 13 and holding sections 12A. Protrusions 13B at the lower end of light guide unit 13 are latched in holes 12C. Light guide unit 13 is accommodated and latched in holder 12, thus providing the illumination knob.

[0027]

As shown in Fig. 1, even when force is applied to display section 13A at of an upper surface of knob section 11, elastic pawls 11C is not opened in right and left directions. The reason is that the inner surface and the outer surface of elastic pawl 11C are sandwiched between the outer surface of light guide unit 13 and holding sections 12A.

[0028]

Then, the illumination knob is mounted at a switch provided on a control panel. When a luminous element, such as a light bulb or a light

emitting diode, in the control panel emits light, the light is transmitted through light guide unit 13 and illuminates display section 13A inserted into opening 11A. The structure discussed above allows the position of the knob to be confirmed and recognized even in a dark.

[0029]

According to the present embodiment, the inner surface and the outer surface of elastic pawl 11C are sandwiched between the outer surface of light guide unit 13 and holding sections 12A. Therefore, even when display section 13A of an upper surface of knob section 11 is pressed by strong force, elastic pawl 11C is not opened. The illumination knob can secure holding of components, and adhesion or welding is not necessary, so that an inexpensive and easy-assembling illumination knob can be obtained.

[0030]

As shown in a sectional view of Fig. 3, extending section 11D is provided outside elastic pawl 11C of the lower surface of knob section 11, and protrudes downward. An inner surface of extending section 11D contacts an outer surface of holding sections 12A of holder 12. Therefore, extending section 11D prevents holding sections 12A of holder 12 from deforming, thus holding the constituent components more securely.

[0031]

According to the embodiment, recess 11B is formed in the outer surface of elastic pawl 11C, and protrusion 12B is formed at the inner surfaces of holding sections 12A. However, a protrusion may be formed at the outer surface of elastic pawl 11C and a recess, which is latched on the protrusion, may be formed in the inner surfaces of holding sections 12A. This

structure provides the same effect.

[0032]

[Advantage of the Invention]

As discussed above, the present invention can provide an inexpensive and easy-assembling illumination knob which secures holding of components and a manufacturing method using the same.

[Brief Description of the Drawings]

[Fig. 1]

It is a sectional view of an illumination knob in accordance with an exemplary embodiment of the present invention.

[Fig. 2]

It is an exploded sectional view of the illumination knob in accordance with the embodiment.

[Fig. 3]

It is a sectional view of another illumination knob in accordance with an exemplary embodiment.

[Fig. 4]

It is a sectional view of a conventional illumination knob.

[Fig. 5]

It is an exploded sectional view of the conventional illumination knob.

[Description of the Reference Numerals and Signs]

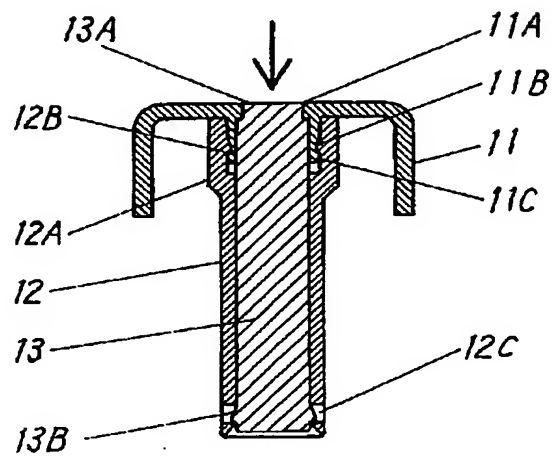
11	knob section
11A	opening
11B	recess
11C	elastic pawl

11D	extending section
12	holder
12A	holding section
12B	protrusion
12C	hole
13	light guide unit
13A	display section
13B	protrusion

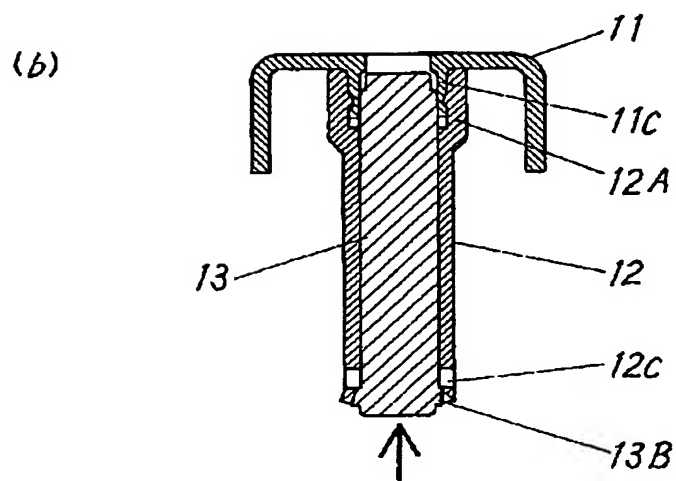
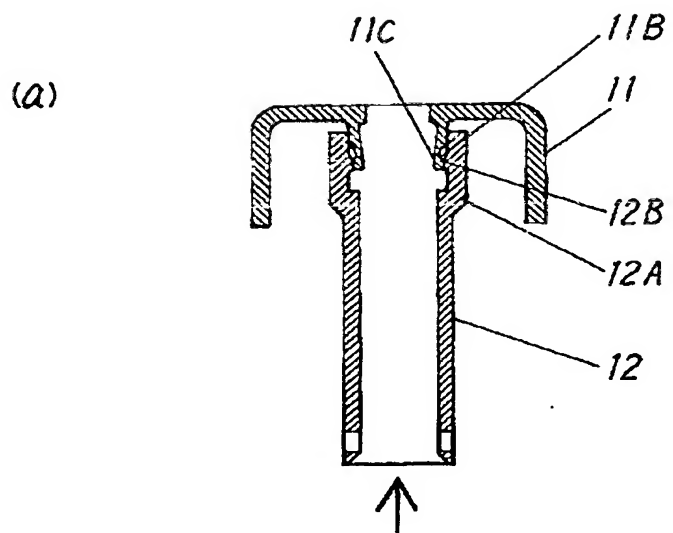
[Name of the Document] Drawings

[Fig. 1]

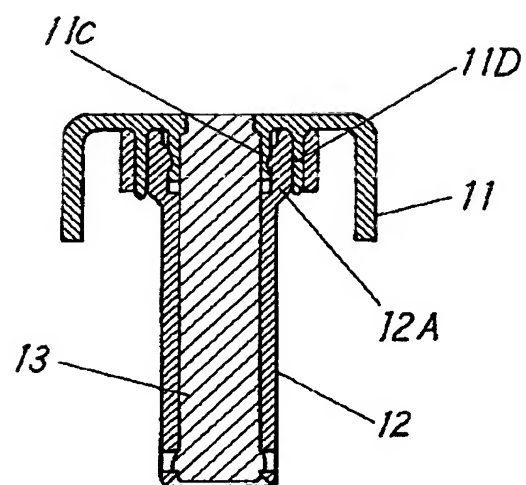
- | | |
|---------------------|---------------------|
| 11 knob section | 12B protrusion |
| 11A opening | 12C hole |
| 11B recess | 13 light guide unit |
| 11C elastic pawl | 13A display section |
| 12 holder | 13B protrusion |
| 12A holding section | |



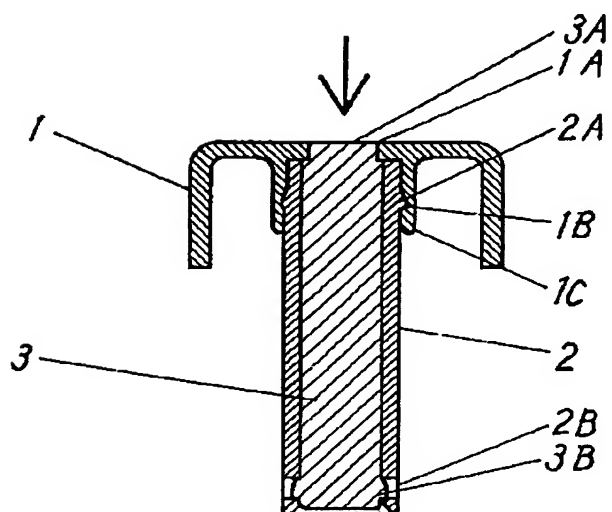
[Fig. 2]



[Fig. 3]

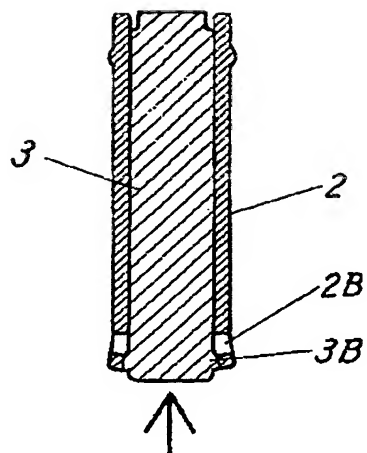


[Fig. 4]

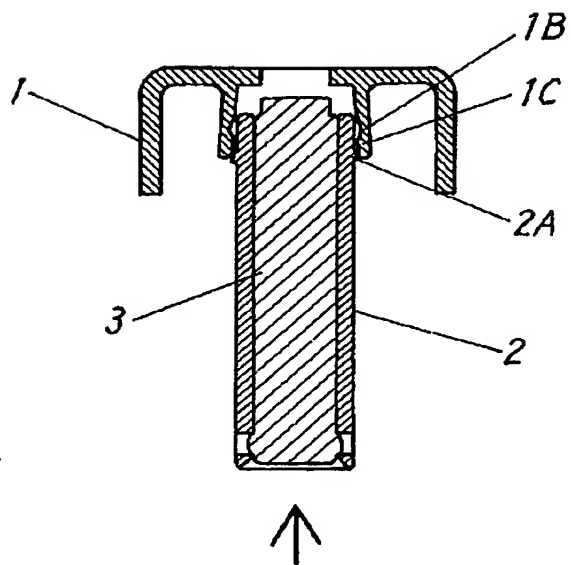


[Fig. 5]

(a)



(b)



[Name of the Document] Abstract

[Abstract]

[Object]

The present invention relates to an illumination knob used at a controlling panel of a vehicle or the like and to a method of manufacturing the knob, and aims to provide an inexpensive and easy-assembling illumination knob which secures holding of components

[Means to Solve the Problems]

Elastic pawl 11C, which protrudes downward and contacts an outer surface of light guide unit 13 at its inner surface, is provided at a lower surface of knob section 11. Holding section 12A, which contacts an outer surface of elastic pawl 11C, is provided at holder 12. Recess 11B of elastic pawl 11C and protrusion 12B of holding section 12A are latched each other, so that an illumination knob is constructed. An inner surface and an outer surface of elastic pawl 11C are sandwiched between an outer surface of light guide unit 13 and holding section 12A. Therefore, the illumination knob which secures holding of components can be obtained.

[Selected Drawing] Fig. 1